

Review Guide to the National Science Content Standards

Grades 5-8

Earth & Space Science

The links below provide an entertaining mechanism to assist a student about to enter high school in reviewing the major scientific concepts expected to be have been mastered upon completion of 8th Grade.

Fundamental concepts and principles that underlie this standard are highlighted in red:

STRUCTURE OF THE EARTH SYSTEM

The solid earth is layered with a lithosphere; hot, convecting mantle; and dense, metallic core.

- http://www.windows.ucar.edu/cgi-bin/tour.cgi?link=/earth/Interior_Structure/interior.html&art=ok&cdp=/windows3.html&cd=false&frp=/windows3.html&fr=f&sw=false&edu=mid (Structure of the interior of the Earth)
- http://volcano.und.nodak.edu/vwdocs/vwlessons/plate_tectonics/part1.html (diagram of Earth's layers)
- <http://www.earth.monash.edu.au/~greg/Conv.html> (Convection in the earth's mantle animation)
- http://www.windows.ucar.edu/cgi-bin/tour_def/earth/interior/earths_crust.html (Lithosphere diagram)

Lithospheric plates on the scales of continents and oceans constantly move at rates of centimeters per year in response to movements in the mantle.

- http://www.windows.ucar.edu/cgi-bin/tour.cgi?link=/earth/interior/plate_tectonics.html&frp=/windows3.html&fr=f&sw=false&edu=mid&art=ok&cdp=/windows3.html&cd=false (Plate tectonics)

Major geological events, such as earthquakes, volcanic eruptions, and mountain building, result from these plate motions.

- <http://www.pbs.org/wnet/savageearth/animations/volcanoes/index.html> (Savage Earth/Volcanic eruptions...good, simple animation)
- <http://www.pbs.org/wnet/savageearth/animations/earthquakes/index.html> (Savage Earth/earthquake animation)
- <http://www.pbs.org/wgbh/aso/tryit/tectonics/> (plate tectonics activity)

Landforms are the result of a combination of constructive and destructive forces. Constructive forces include crustal deformation, volcanic eruption, and deposition of sediment, while destructive forces include weathering and erosion.

- http://abe.www.ecn.purdue.edu/~agen521/epadir/erosion/types_erosion.html (Types of erosion...still photos)
- <http://www.looksmart.com/r?page=/search/frames/index.html&isp=US&name=&bcolor=ffcc00&key=erosion+video&url=http%3a//www.weru.ksu.edu/vids&pskip=&nskip=15&se=0,0,0,0,1000&index=5> (Wind erosion video archives....4 downloads: Dust Bowl, etc.)

Some changes in the solid earth can be described as the "rock cycle." Old rocks at the earth's surface weather, forming sediments that are buried, then compacted, heated, and often recrystallized into new rock. Eventually, those new rocks may be brought to the surface by the forces that drive plate motions, and the rock cycle continues.

- <http://www.looksmart.com/r?page=/search/frames/index.html&isp=US&name=&bcolor=ffcc00&key=rock+cycle+animation&url=http%3a//www.branches.co.uk/earth/rockcycle.htm&pskip=&nskip=15&se=1,0,0,0,589&index=2> (Rock cycle animation ...good, easy to understand)

Soil consists of weathered rocks and decomposed organic material from dead plants, animals, and bacteria. Soils are often found in layers, with each having a different chemical composition and texture.

- <http://www.soils.rr.ualberta.ca/soa/horizon.cfm> (soil layering)
- <http://www.statlab.iastate.edu/soils/index.html/> (soil surveying as a career)

Water, which covers the majority of the earth's surface, circulates through the crust, oceans, and atmosphere in what is known as the "water cycle." Water evaporates from the earth's surface, rises and cools as it moves to higher elevations, condenses as rain or snow, and falls to the surface where it collects in lakes, oceans, soil, and in rocks underground.

- [http://ww2010.atmos.uiuc.edu/\(Gh\)/guides/mtr/hyd/home.rxml](http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/hyd/home.rxml) (Hydrologic cycle including evaporation, condensation, etc.)

Water is a solvent. As it passes through the water cycle it dissolves minerals and gases and carries them to the oceans.

- http://www.stwater.co.uk/APPS/STWInternet/STW0650.nsf/STW_Web?OpenForm&LearningZone_TheWaterCycle_AnimationSequenceManMade (Water cycle animation—elementary but good review)
- http://www.windows.ucar.edu/cgi-bin/tour.cgi?link=/earth/Water/water_cycle.html&cd=false&cdp=/windows3.html&art=ok&frp=/windows3.html&fr=f&sw=false&edu=mid (Water cycle...with link to evaporation)
- <http://ww2010.atmos.uiuc.edu/%28Gh%29/guides/mtr/hyd/smry.rxml> (Summary of the hydrologic cycle)

The atmosphere is a mixture of nitrogen, oxygen, and trace gases that include water vapor. The atmosphere has different properties at different elevations.

- <http://www.crpc.rice.edu/CRPC/GT/louviere/comp.html> (gases in the atmosphere)
- <http://www.crpc.rice.edu/CRPC/GT/louviere/struct.html> (Properties of the atmosphere at various altitudes)
- <http://www.crpc.rice.edu/CRPC/GT/louviere/riddles.html> (Atmospheric riddles/answers)
- <http://liftoff.msfc.nasa.gov/academy/space/atmosphere.html> (layers of the atmosphere described)
- <http://www.onlineastronomy.com/astr161/lect/earth/atmosphere.html> (layers of the atmosphere diagram)

Clouds, formed by the condensation of water vapor, affect weather and climate.

- http://www-airs.jpl.nasa.gov/html/edu/clouds/What_are_clouds.html (Clouds—general overview)
- http://www.cloudman.com/gallery1/gallery1_1.html (gallery of various labeled cloud photos)

Global patterns of atmospheric movement influence local weather. Oceans have a major effect on climate, because water in the oceans holds a large amount of heat.

- <http://www.csu.edu.au/weather.html> (Weather & Global Monitoring)
- <http://www.prosi.net/mag97/346nov/lnino346.htm> (Global weather/El Nino)
- <http://users.massed.net/~prodanas/weather.htm> (Project Global Weather)

Living organisms have played many roles in the earth system, including affecting the composition of the atmosphere, producing some types of rocks, and contributing to the weathering of rocks.

EARTH'S HISTORY

The earth processes we see today, including erosion, movement of lithospheric plates, and changes in atmospheric composition, are similar to those that occurred in the past. Earth history is also influenced by occasional catastrophes, such as the impact of an asteroid or comet.

- <http://www.planetscapes.com/solar/eng/earthint.htm> (Earth's Interior & Plate Tectonics)...a bit advanced)
- <http://nssdc.gsfc.nasa.gov/planetary/planets/asteroidpage.html> (NASA's asteroid & comet homepage)
- <http://www.skypub.com/sights/asteroids/asteroids.shtml> (Sky & Telescope Magazine's asteroid site)
- <http://www.eecs.wsu.edu/~hudson/Research/Asteroids/> (Earth-crossing asteroids)
- <http://www.seds.org/nineplanets/nineplanets/comets.html> (Comets—general overview)

Fossils provide important evidence of how life and environmental conditions have changed.

- <http://www.notam.uio.no/~oyvindha/fossils.html> (fossils, photos, etc.)

EARTH IN THE SOLAR SYSTEM

The earth is the third planet from the sun in a system that includes the moon, the sun, eight other planets and their moons, and smaller objects, such as asteroids and comets. The sun, an average star, is the central and largest body in the solar system.

- <http://www.littleexplorers.com/subjects/astronomy/solarsystem/where.shtml> (general overview of solar system, asteroids, etc.)
- <http://www.solarsystem.f2s.com/model2.html#TOP> (relative size/distance scale)
- http://www.alcdsb.on.ca/~jjon/educate_you/space/solar/quiz/start.html (basic quiz after prior review elsewhere)
- http://www.activitytree.com/library/sol_quiz.shtml (10 question quiz to be used after prior reviewing elsewhere)

Most objects in the solar system are in regular and predictable motion. Those motions explain such phenomena as the day, the year, phases of the moon, and eclipses.

- <http://www.astro.wisc.edu/~dolan/java/MoonPhase.html> (animated moon phases)
- <http://tycho.usno.navy.mil/vphase.html> (Virtual Reality Moon Phases)
- http://www.soest.hawaii.edu/spacegrant/class_acts/AlkaRocket.html (Alka Seltzer Rockets)
- <http://www.bridgewater.edu/departments/physics/ISAW/PlanetOrbit.html> (animated motion of a moon around a planet with variability of masses of each)
- <http://www.aloha.com/~isaac/3laws/1mid.htm> (Newton's First Law of Motion—explanation with still images)
- <http://www.glenbrook.k12.il.us/gbssci/phys/Class/newtlaws/u2l3a.html> (Newton's Second Law with quiz and still images)
- <http://www.glenbrook.k12.il.us/gbssci/phys/Class/newtlaws/u2l4a.html> (Newton's 3rd Law with quiz—explanation with still images)
- <http://www.bridgewater.edu/departments/physics/ISAW/PlanetOrbit.html> (Interactive Planetary Orbits....advanced math with Kepler's Laws, etc.)
- <http://csep10.phys.utk.edu/astr161/lect/history/kepler.html> (Kepler's Laws of Motion...advanced)

Gravity is the force that keeps planets in orbit around the sun and governs the rest of the motion in the solar system. Gravity alone holds us to the earth's surface and explains the phenomena of the tides.

- <http://www.sfgate.com/getoutside/1996/jun/tides.html> (Animation of the causes of tides)
- <http://www.looksmart.com/r?page=/search/frames/index.html&isp=US&name=&bcolor=ffcc00&key=causes+of+tides&url=http%3a//www.howstuffworks.com/question72.htm&pskip=&nskip=15&se=3,0,4,0,1000&index=4> (What causes daily high and low tides...with links to Tides and the Moon and Tides)
- <http://zebu.uoregon.edu/~soper/Orbits/newtongrav.html> (Still images of Newton's Law of Gravity)
- <http://csep10.phys.utk.edu/astr161/lect/history/newtongrav.html> (Newton's law of Gravitation/Kepler's Laws—still images)
- http://www.soest.hawaii.edu/spacegrant/class_acts/GGauge.html (Making a gravity gauge)

The sun is the major source of energy for phenomena on the earth's surface, such as growth of plants, winds, ocean currents, and the water cycle.

- <http://seds.lpl.arizona.edu/nineplanets/nineplanets/sol.html> (The Sun—general overview)
- <http://www.solarviews.com/eng/sun.htm> (The Sun, statistics, eclipses, flares, etc.)

Seasons result from variations in the amount of the sun's energy hitting the surface, due to the tilt of the earth's rotation on its axis and the length of the day.

- <http://csep10.phys.utk.edu/astr161/lect/time/seasons.html> (causes of seasons with still images)
- <http://www.lalc.k12.ca.us/laep/smart/Sunrise/4-7les4.html> (Seasons—demonstration with home activity)
- <http://www.howstuffworks.com/framed.htm?parent=question165.htm&url=http://www.efni.com/~brentt/tourist/earth2.htm> (the seasons explained)
- <http://www.howstuffworks.com/framed.htm?parent=question165.htm&url=http://www.hcrhs.hunterdon.k12.nj.us/science/axis.html> (The four seasons...well explained--no animation)
- <http://www.howstuffworks.com/framed.htm?parent=question165.htm&url=http://www.hcrhs.hunterdon.k12.nj.us/science/axis.html> (Seasons' Reasons...good explanation—no animation)